

Peat for Energy

Ireland's energy requirements exceed 10 million tonnes of oil equivalent (TOE) and the national expenditure on energy exceeds £2.5 billion annually. Ireland's indigenous energy sources supply 12% of its total energy requirements. Total primary energy requirement is a measure of all energy consumed in the country. In Ireland, because of overall growth, primary energy requirement in 1993 was 24% higher than it was in 1980. In this period the contribution of peat to Ireland's energy requirement has remained fairly constant in terms of tonnage used per annum.

Before indigenous natural gas came on stream in 1979, peat was the most important indigenous energy resource. Peat has been used for electricity generation since the 1950s. Its contribution peaked in the mid 1960s when it provided just under 40% of Ireland's total power generation. In 1980, it contributed 21% of the fuels that went into generation while in 1995 this figure was 16%. Electricity demand has continued to grow over the decades but there has been no increase in the peat fired generating capacity of the ESB since the 1980's. Installed ESB generating capacity for peat is 420 MW in 5 stations. Peat is supplied by Bord na Móna to the peat fired power stations run by the ESB in Ferbane, Rhode, Lanesboro, Shannonbridge and Bellacorick.

EUROPEAT:

The construction in the east midlands of a new 120 MW peat fired station, opened in 2000, will reduce the rate of decline in the proportion of electricity generated from peat as compared to other fuels. One million tonnes of peat will be consumed annually and this will help to reduce overall fuel importation, and Ireland's vulnerability to the supply of fuel imports and currency changes.

Primary energy sources for electricity generation (% Total):

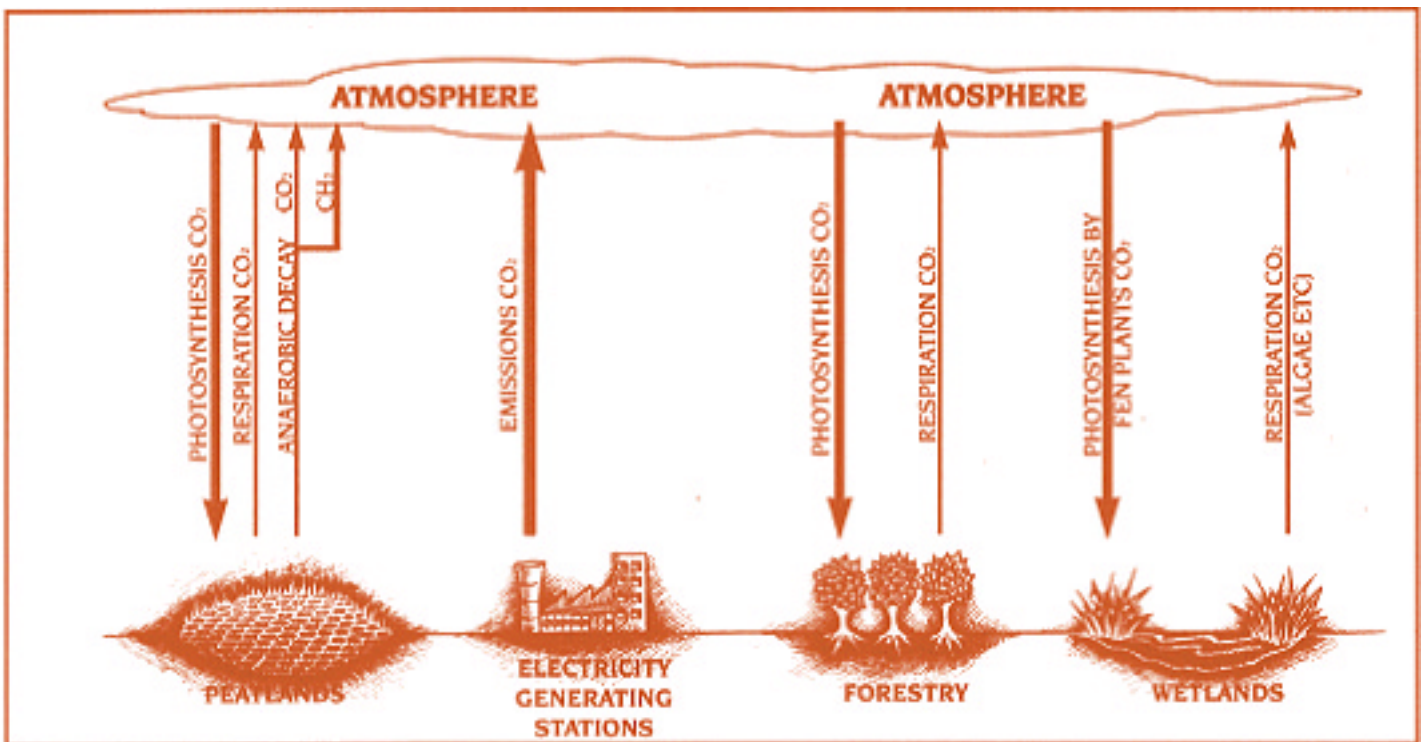
	Peat	Coal	Oil	Natural Gas	Hydro	Other Renewables	Total%	Units TWhr Generated
1975	32	1	63	0	4	0	100%	7.30
1980	21	1	59	16	3	0	100%	10.21
1985	27	1	21	48	3	0	100%	10.97
1990	19	41	11	27	2	0	100%	13.90
1995	16	40	16	27	1	0	100%	17.24
2000	13	28	19	36	2	2	100%	
2005	13	27	7	49	1	3	100%	
2010	9	22	10	55	1	3	100%	

PEAT AND GREENHOUSE GASES:

Ninety-five percent of man-made carbon dioxide comes from energy transformation processes. The burning of fuels such as petrol, diesel, and home heating oils, results in carbon dioxide (CO₂) emissions. So does the burning of coal, oil, gas and peat for power generation.

However the relationship between peatlands and carbon is quite complex. In their natural state, peatlands act as carbon sinks. They absorb carbon dioxide, (See Formation and Types of Peatlands on how bogs are formed) and store the carbon fixed through photosynthesis. Growing peatlands also release methane to the atmosphere, and this is a much more potent greenhouse gas, as well as some carbon dioxide, due to respiration (the process where CO₂ is formed from the breakdown of carbohydrates in plants). When peatlands are drained and developed, they stop absorbing carbon dioxide and emissions of methane also cease. When peat is harvested and used as a fuel the stored carbon is released back into the atmosphere as carbon dioxide. In the post production phase, the cutaway peatlands can be reclaimed for forestry, or restored to wetlands (See Cutaway Peatlands on their use), and once again become carbon sinks. This contrasts with other sources of energy, such as coal, oil or natural gas, which are extracted from deep underground and which cannot generally be restored to active carbon sinks. The exact relationship between peatlands and the carbon cycle is being studied in more depth by Bord na Móna in conjunction with the Peat Technology Centre at University College, Dublin.

SCHEMATIC OF CARBON CYCLE:



PEAT AS A FUEL:

Although the chemical composition of anhydrous peat and its calorific value are fairly uniform from bog to bog and over the depth of any bog, considerable variations can occur in density, fibrous content and degree of humification. (See Raised Bogs)

Peat consists of organic materials derived almost completely from the accumulated remains of vegetation currently or formerly growing at the site of occurrence. Peat is found in all stages of decomposition, and can be classified in many different ways often according to its usefulness for a wide variety of purposes, which can be for horticulture, energy or industry.

Peat to be used for energy purposes should be low in mineral material in order to ensure that certain limits on ash content are not exceeded. An independent attempt to classify peat types was made by von Post, a Swedish scientist.

This classification is based on:

- the degree of humification
- the dominant original plant constituents in terms of moss, grass or wood
- the moisture content
- the fine fibre content
- the presence of wood
- contamination

The milled peat product received at the generating stations or briquette factories exhibits variations in density, sizing and moisture content.

CHARACTERISTICS OF MILLED PEAT:

Fuels are purchased by a variety of measures - kilogrammes and tonnes weight, litres and cubic metre volumes, and therms of heat. All of these can be expressed in terms of the common unit of energy, the gigajoule (GJ), so as to enable comparisons of delivered energy costs to be made. The efficiency with which the heating system converts the fuel into used heat must also be taken into account.

Moisture Content	55%
Ash Content	1.5% - 3.0%
Volatile Matter	30%
Fixed Carbon	13.5%
Calorific Value Gross	21 - 22 MJ/kg
Calorific Value Nett	7.7 MJ/kg
Density range kg/m ³	160 - 500

COMPARISON WITH OTHER FUELS:

On a worldwide scale, peat is a minor contributor to energy production and use. Peat contributes only about one thousandth of the energy used globally. Locally, however, it can be important. For instance in Finland it contributes about 5% to primary energy consumption, and in Ireland the figure is nearer 10%. In Russia, which was formerly the largest user of fuel peat, consumption represents less than 0.3% of primary energy.

Fuel	Moisture Content%	Density KG/M³	Nett C.V. MJ/kg
Milled Peat	55	350	7.7
Wood	30	370	12.5
Sod Peat	35	350	12.8
Peat Briquettes	12-15	750	17.7
PDF	10	770	22.0
Coal	9	800	25.0
K-Fuel	5	800	27.0
Anthracite	5	870	29.3
Heavy Fuel Oil	-	950	40.6

USES OF PEAT:

Up to 70% of peat extracted is sold for non-energy purposes, principally in agriculture and horticulture. The end use has a bearing on the overall economics of extraction. The drainage of peatlands for forestry and agriculture has affected large areas of land in the past, and has heightened the sensitivity of environmentalists to the possible damage of peat development. This has to be balanced against the advantages to society from its use.

BORD NA MÓNA PEAT ENERGY LIMITED:

Bord na Móna is a state owned company established in 1946. It has a responsibility, according to the acts of the Oireachtas which set it up, to “develop Ireland’s peat resources”. It has four main businesses which produce peat based and other products for electricity generation, domestic heating, horticulture and environmental cleansing.

The business within Bord na Móna which is responsible for the production of milled peat for electricity generation is the Bord na Móna Energy Limited. 4 million tonnes of milled peat are produced annually by the company. The milled product is supplied to the ESB for the generation of power in the five power stations and to two briquette factories for the manufacture of Peat Briquettes.

PEAT FIRED STATIONS:

